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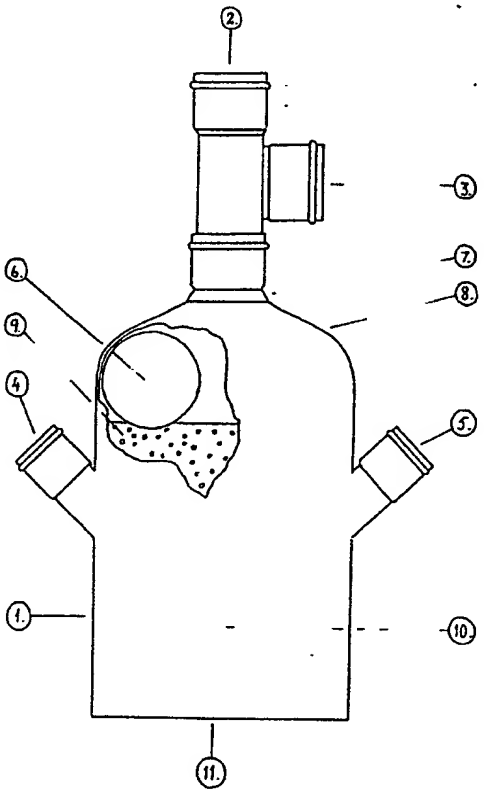
(54) Title: SAFETY DEVICE

(57) Abstract

Draining tank comprising a sludge space, where there are connections (4, 5) for downpipes and other feed lines and discharge pipes for surface water. Above these connections the tank tapers off via a shoulder portion (8) to a seat (7) of a floatable ball arranged in the tank (6), which will abut against the seat when the water is rising and will seal the connection upwardly so that the water from the tank cannot penetrate into the connection (3) of the drainage water, which connection (3) is arranged together with a vertical connection for cleaning sludge removal.



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SAFETY DEVICE

This invention relates to a safety device for drainage systems and floordrains. Drainage systems, e. g. systems for drainage pipes deposited in the ground to keep the ground water level at houses and the like on a desired level are generally on the outlet side connected to surface water drain systems. These surface water drain systems do not only take charge of drainage water but also water coming from gully holes and downpipes from roofs. Moreover, in certain cases the surface water drain system and the sewer system are combined. The water level of the ground drainage system and the water in the floor drains may often be slightly different. E. g. heavy cloudbursts, combined with settling of ground and sludge accumulations may cause the water level in the system to rise and water flows into the sub soil drainage pipes.

This backward flow will easily lead to an increase of the moisture content of surrounding filling as well as joists, basement floor or basement walls. Especially at combined systems but also at other there is a risk, as a consequence of this backward flow to the drainage system, that sludge and other unpleasant matter such as paper, is fed into the drainage system and is deposited there, particularly as the water flow out of the drainage pipes can be too slow to move possibly deposited material and flush it back.

Moreover, in some countries sub soil and surface water is led to ditches and with a flow into the drainage system the risk of organic matter entering the drainage system is still greater.

In view of what has been stated above it is the object of the invention to provide a back water preventing safety device for water outlet systems and in particularsub soil drainage systems permitting the connection of a sub soil drain sys-

tem either to a surface water system or a common sewer system eliminating the risk of surface water or, in case of a common discharge, waste water penetrating into the sub soil drainage system.

Further advantages and characteristic features of the invention appear in greater detail from the claims as well as the description below in connection with drawings of prefered embodiments of the invention, Fig 1 showing a first device according to the invention and Fig 2 a seccond one and Figs 3 and 4 a third and a fourth resp..

The device shown in Fig 1 comprises a tank 1 with a bottom and a sludge space 10 above said bottom. In the upper part of this sludge space 10 there are inclined, upwardly directed connections 4, 5 for connection to downpipes outlet and surface water drain, respectively. Above these inclined connections the tank tapers off via a shoulder portion 8 forming the frustrum of a cone with its apex turned upwards. The cone 8 passes onto a connection or seat 7. A ball 6 placed in the tank can abut against the seat 7 as it is centered by the tapered shoulder portion and is lifted by water 9 in the tank 1 if the supply of the downpipe water and surface water drain is so great that the outlet sewer cannot swallow this. Accordingly the ball 6 prevents water from penetrating up to the upwardly directed connection of drainage water. The sub soil water enters the tank via a T-piece with a connection 3 for the sub soil water and an upwardly directed connection 2. This connection 2 can be used as an opening for cleaning out the tank by means of an extension. The tank will make it possible to bring together drainage water and downpipe water without the risk of backward flow in the drainage pipes.

By using freely floating ball as float body the latter will turn round in case of deposits and have a side without deposits upwards. Besides, the movements of

the ball i. a. as a consequence of deposit and accompanying unbalance will keep this free of deposits in this way.

The tank of the invention can either be used instead of a surface water shaft or as a complement to an existing one.

In Fig 2 it is shown how the inventive idea has been used in a small and compact service clean out floor. As in Fig 1 the device comprises a freely floating ball 24 in space 26 which upwardly tapers off like a funnel to a connection 21 simultaneously being a sealing seat of the ball at a rising water level. The discharge connection 21 is connected to the sewer from the house instead of the ground drain system around a housing. In this way flooding of basements at torrential rains will be prevented which has been of an ever increasing importance. The safety device shown in Fig 2 is not like the tank in Fig 1 primarily intended for sludge collection, but of course it can also be cleaned easily by inserting a sludge exhauster through the discharge connection 21. 25 designates the outlet of the service clean out, forming light bend so that a water trap is obtained. This water trap need not be quite watertight but the lip levels may be such that the connected outlet pipe can be ventilated. As is apparent from Fig 2 the safety drain is manufactured in two pieces, a lower portion and a cover which is necessary in order that the freely floating ball might be inserted. Sealing and assembly of the two parts belong to known art and have therefore not been described in greater detail.

The great advantage of the invention is that no waterproof seals have to be open in order to clean tank or clean out,in fact sludge deposits can be removed with a minimum of work. In order to stir sedimented sludge for removal, water under high pressure can be used for

instance in the safety device by use of the connection 22, particulary designed for this.

As can be seen from Fig 3 this version of the safety device in accordance with the invention is somewhat more sofisticated. Funktion in general is however same as for above versions with a frustocronical top 34 in which a ball 45 can close an upper inlet if the water level in the device becomes to great in order to prevent back water, when water from different sources is to be drained away. A first difference is established by an additional cap being arranged over the top of the safety device. This cap 35 encloses the top 34 of the device but with an intermediate space 36 there between. The cap is sealed against the top entrence pipe 38 of the device and below this seal holes 37 are provided in this entrance pipe or connection 38. In this way water can be drained away at the device itself. The water entering below the lower lip of the cap 35 rises in the space 36 and emerges through the holes 37 and flows into the sludge room 40 of the safety device. The free floating ball 45 can be pushed aside when one wishes to remove possible sludge from the device.

An outlet 46 extends through top 34 and cap 45 and is connected to, for instance, a municipal sewer system.

The safety device is furthermore at its bottom completed by the arrangement of a further sludge room 40a by extending the device downwards with a longitudinal part 32 all over bottom 33 and an intermediate roof 41 also constituting the bottom 42 of the upper sludge room 40. The intermediate roof 41 is provided with a lip extendning to some extent below the upper edge of the longitudinal part 32 and in the latter holes or openings are provided so that water can flow out from the lower sludge room 40a into the surrounding ground. The roof 41 is sealed of from the upper part of the safety device and is

provided with an eccentric extension 39 extending all the way up through the safety device and this pipe is with a T-shaped connection connected to, for instance, pipes carrying water from roffs or the like. This pipe 39 extends all the way up to the surface as the pipe 28 in order to allow sludge removal through these pipes.

Water can enter into the device in three ways: through the pipes 38 or 39 or through the water inlets/outlets 36 and 43 and water can be led away through the outlet 46 or through the water inlets/outlets 36 and 43. The possibility of draining away the water at the safety device itself acctually prolonges the life time of the draining system. This is due to the fact that normal sub soil drain pipes usually will have there draining capacity drasticly reduced allready after a few years, whereas the drain filling around the drain pipe will be effective for a longer time and is in general capable of transporting water along the pipe just as well as the pipe itself. In this way the water can reach the safety device in accordance with the invention and be drained away there and still the drain system is protected against back flow of polluted water from the outlet 46.

A continuously increasing problem today is that acctually too much water is drained away and as a result the ground water level is reduced which leads to settlings that in turn can upset and crack buildings etc. Furthermore trees etc will recieve to little water. It is therefore of great interest if some of the water that is normally led away is allowed to infiltrate the ground. This is achieved by the device shown in Fig 3, with the water pipes from a roof of a building connected to the pipe 39. The sub soil draining around the house can be connected to the pipe 38. If more water reaches the safety device than that can be infiltrated the water level rises up to it reaches the holes 37 and excess water is led away through the outlet

CLAIMS

1. Safety device for preventing backwater, characterized in that it comprises a space which at the top successively tapers off to an inlet connection which is at the same time the seat of a float body arranged in said space, said space further being provided with an outlet connection, the space laterally being wide enough to allow the float body to be pushed aside for cleaning purposes.

2. Safety device as claimed in claim 1, characterized in that the outlet connection forms a water trap.

3. Safety device as claimed in claim 2, characterized in that the water trap does not seal completely but allows of ventilation.

4. Safety device as claimed in any of the preceding claims, especially for connection of sub soil drain pips to surface water systems and/or sewer systems, characterized in that the space is also a space for sludge and the sub soil drain pipes are connected via a T-pipe to the inlet connection so that the inlet connection can also be used without any difficulties for removal of sludge from the space via an extension of the inlet connection extending to the ground surface.

5. Safety device as claimed in any of the preceding claims, characterized in that the float body is floating freely.

6. Safety device as claimed in any one of the preceding claims, characterized in that the float body is a ball or any other object of such a shape.

7. Safety device as claimed in any one of the preceding claims, characterized in that the space above the connection of water discharge also comprises connections for other supplied water, e. g. down-

45.

Fig 4 shows a safety device similar to that in Fig 3 but provided with a connection 50 between the upwards extending pipes 58 and 59 to the pipe 59 a pipe 57 carrying roof surface water is connected. In this way the over flow mentioned in connection with Fig 3 can take place inside the device also and not only externally as in Fig 3, when the water level of infiltration water rises. With the provision of the lower sludge room no sediment will enter the soil when infiltrated.

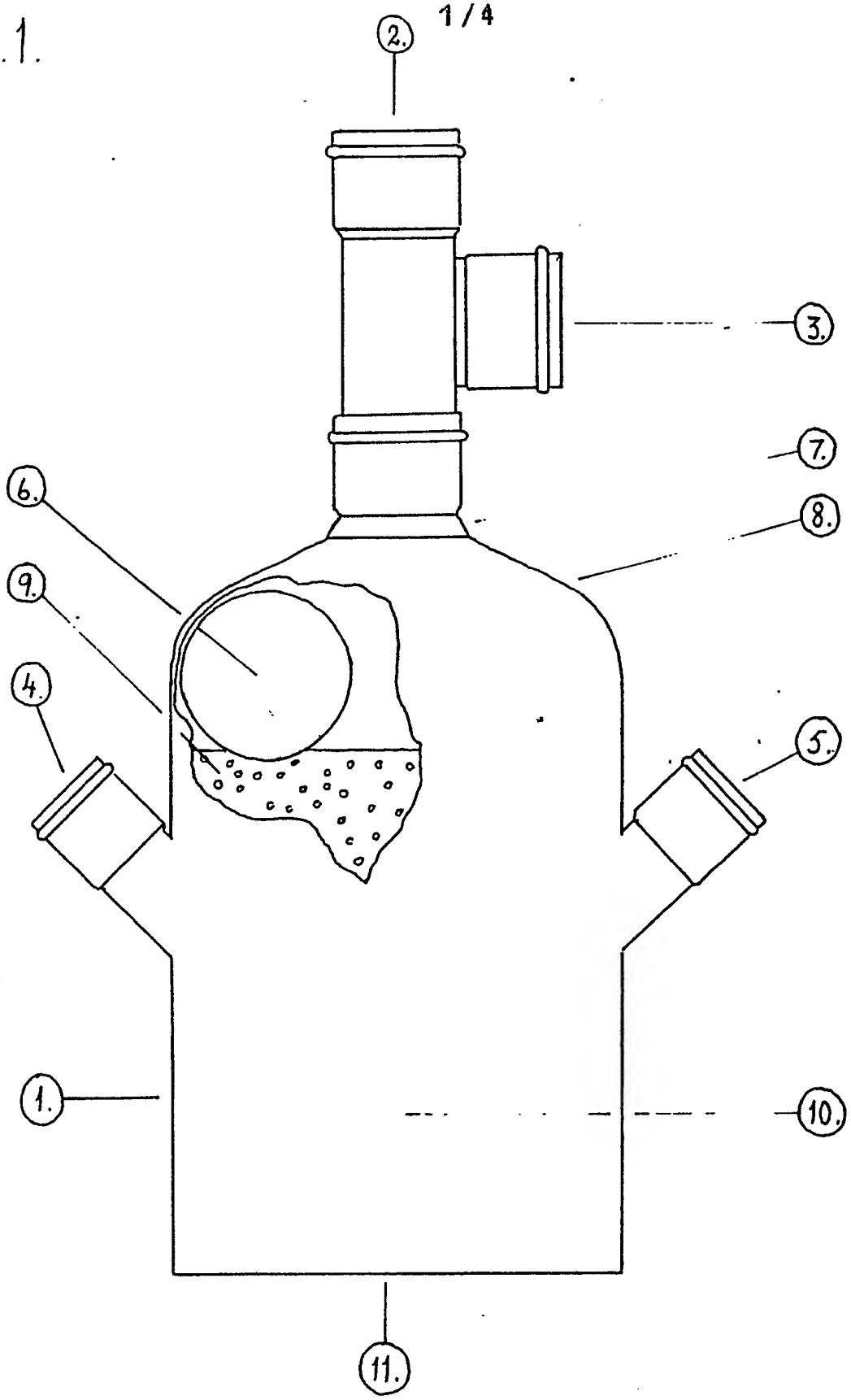
pipe water.

8. Safety device as claimed in any one of the previous claims c h a r a c t e r i z e d i n that it is provided with an additional cap inclosing the top of the device leaving an intermediate space therebetween so that water can enter into this space and rise to the top where the inlet connection is provided with holes allowing the rising water to flow into the device thus giving the device itself draining properties.

9. Safety device as claimed in any one of the previous claims c h a r a c t e r i z e d i n that the device at the bottom is provided with a bottom sludge chamber sealed relative the upper sludge chamber in which the ball floates, the lower sludge chamber being provided with at its top outlets in particular designed for infiltration and preferably in the shape of an inverted water trap or water traps and that the lower sludge chamber further is provided with a pipe extending up through the device to be connected on the upper side to the top inlet of the safety device as well as to a water drain source.

10. Device according to claim 9 c h a r a c t e r i z e d i n that the pipe leading up from the bottom sludge chamber through the safety device extends straight up to the ground level in order to enable sludge removal from this chamber.

FIG. 1.



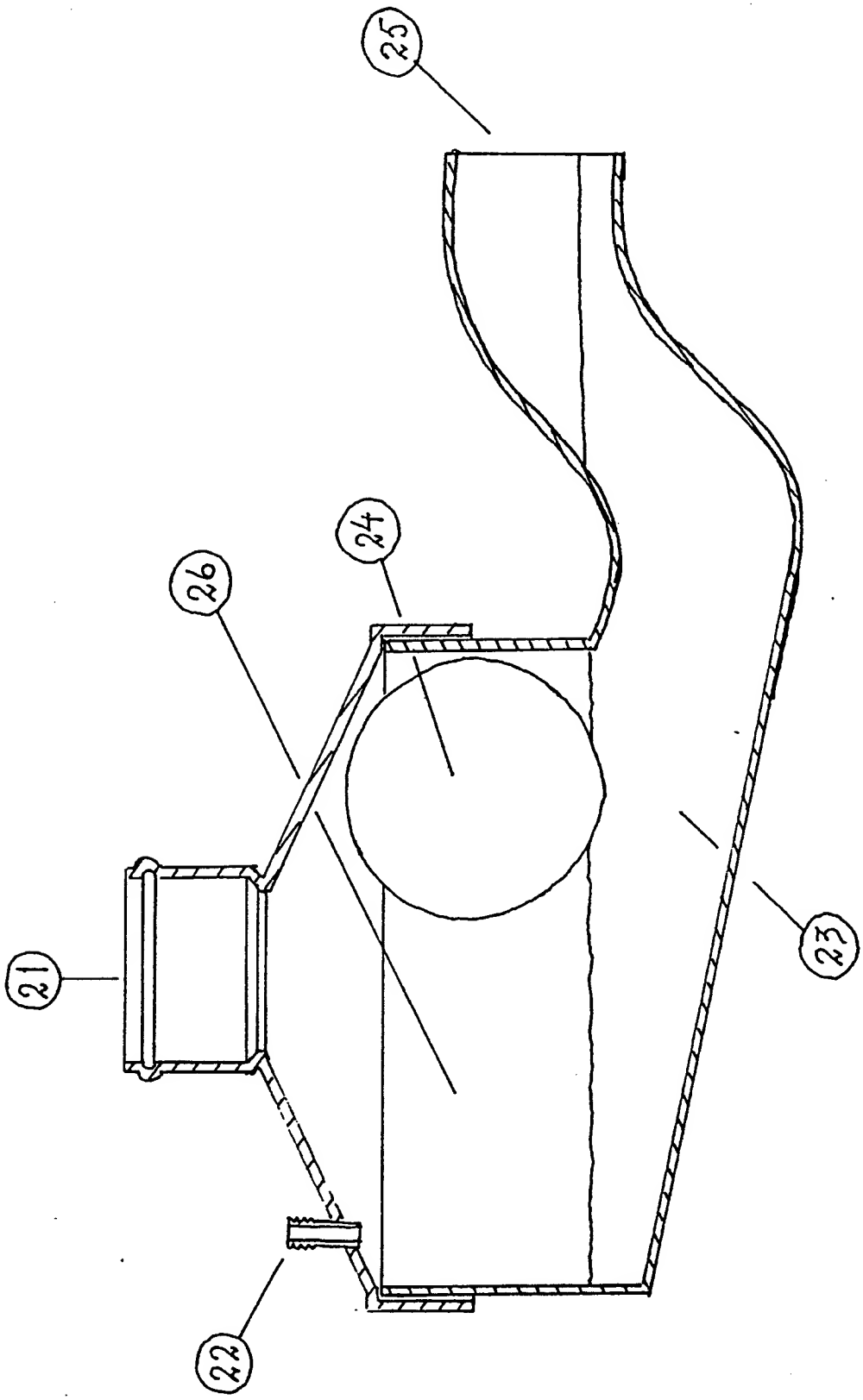


FIG.2.

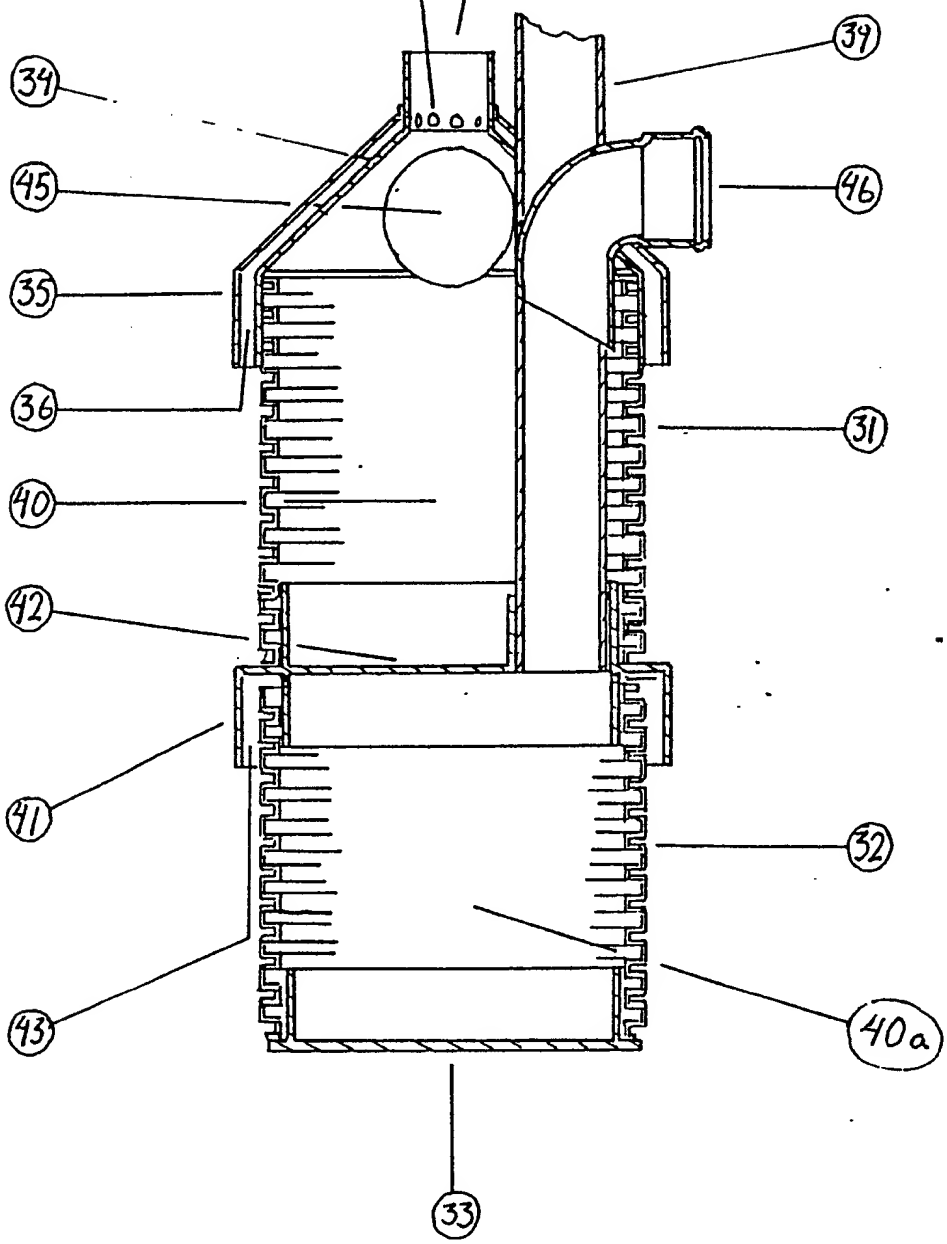
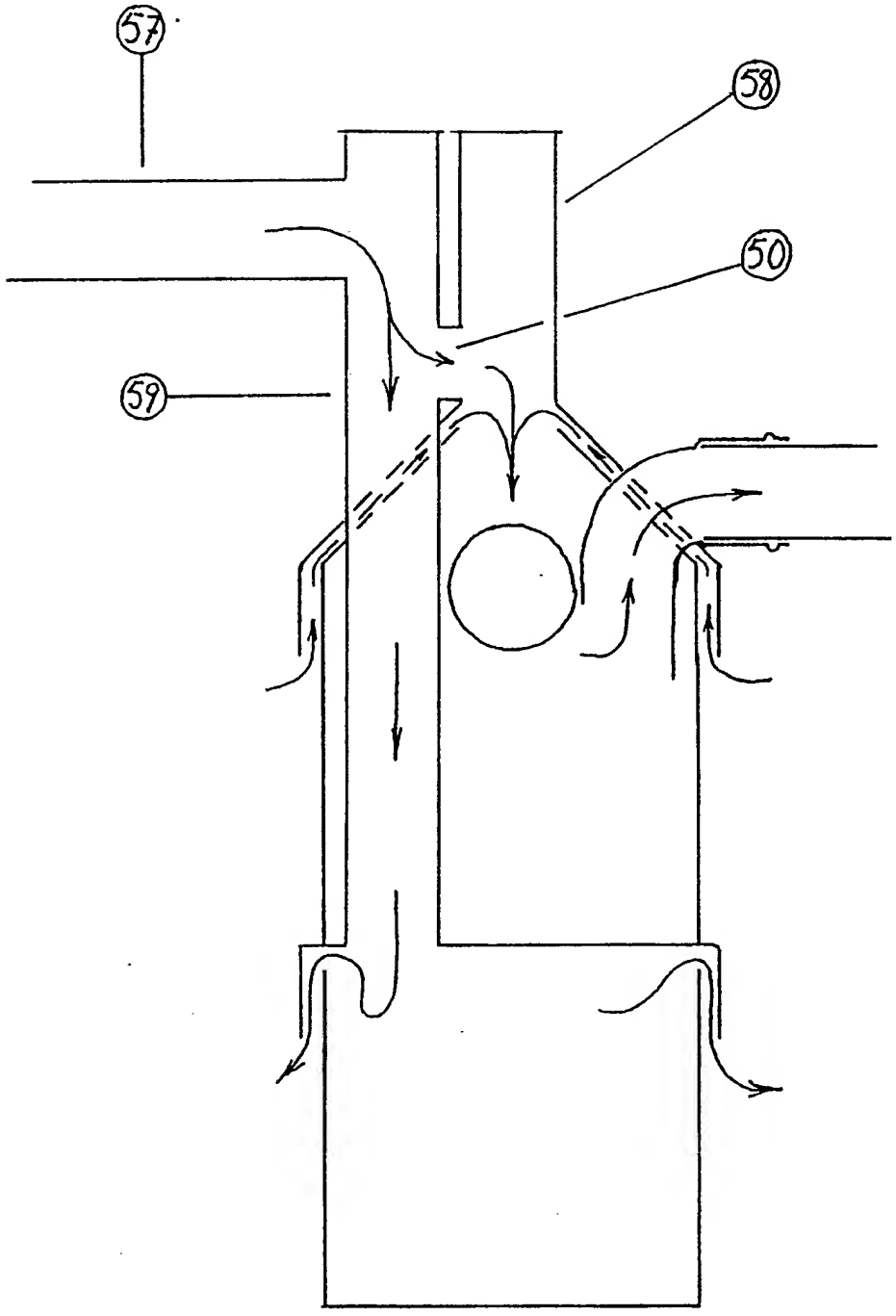


FIG. 3.

FIG. 4.



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE85/00306

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [5]

According to International Patent Classification (IPC) or to both National Classification and IPC 4

E 03 F 5/042, E 03 F 1/00

II. FIELDS SEARCHED

Minimum Documentation Searched [7]	
Classification System	Classification Symbols
IPC 4	E 03 F 1/00, 5/00-/06, 5/14-/20, 7/00-/04; E 04 D 13/08; .../...

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X, E	SE, A, 8400728-5 (T SÖDERSTRÖM, G W SÖDERSTRÖM) 11 August 1985	1-7
X, Y	US, A, 1 318 545 (G J DEHN) 14 October 1919 see page 1, lines 60-78	1-7
X	US, A, 1 356 530 (A M KHUN) 26 October 1920	1-3, 5-6
X	US, A, 600 732 (T LINKE) 15 March 1898	1-3, 5-6
X	US, A, 4 046 161 (B BONNEAU) 6 September 1977 & CA, 1017220	1, 5-6
Y	SU, A, 1038-427 (LENGD ENG CONS INST) 30 August 1983	9, 10
A	SE, A, 8201544-7 (S ANDERSSON) 12 October 1983	

.../...

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
1986-02-05	1986 -02- 10
International Searching Authority	**Signature of Authorized Officer**
Swedish Patent Office	Tommy Blomberg

Form PCT/ISA/210 (second sheet) (January 1985)

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

II Fields searched (cont)

IPC 4 E 02 D 29/12-/14

US Cl 210:116, 119, 163-166, 532, 532.1-.2;
137:247.11-.23, 247.27

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [1]

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers....., because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim numbers....., because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers....., because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [2]

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	DE, C, 716 754 (PASSAVANT-WER KE) 24 December 1941	
A	SE, B, 425 811 (AEROMATOR TRADING COMPANY AB) 8 November 1982	